19 October 2022 | 10:00 - 11:45 CET
Projects promoting heat pump excellence
Agenda

• 10h00 – 10h05 Welcome and Introduction by Irene Egea Saiz, EHPA
• 10h05 – 10h20 Keynote Speech by Livio Calabrese, Frascold Spa
• 10h20 – 11h40 Project presentations and Q&A session moderated by Irene Egea Saiz, EHPA, with:
  
  • “Queens Quay” – HPCY award winning project, presented by Adam Armour Florence, West Dunbartonshire Council
  • “Heat pump as a key enabler in achieving a positive energy building” – Decarbuilding award winning project, presented by Morten Deding, Johnson Controls
  • “Zero emission heat for Orion medical factory” – Decarbindustry award winning project, presented by Petri Vouri, Calefa Oy
  • “The Earth’s favourite little healthy drinks factory ‘the blender’”– People’s Choice award winning project, Presented by Andy Joynson, innocent

• 11h40 – 11h45 Closing of the event by Irene Egea Saiz, EHPA
The Heat Pump Award (HPA)

• The Heat Pump Award (HPA) is an EHPA project which recognises the most efficient, smart and sustainable Heat Pump project at local level.

• The HPA was launched in 2011 under the name of Heat Pump City of the Year (HPCY) Award to highlight cities and regions that have put in place an energy efficient project which takes advantage of Heat Pump technology.
Winning Projects of 2021 brochure

The Heat Pump Award (HPA)
Winning projects of 2021

Download here
The Heat Pump Award in 2023

Stay tuned at hpa.ehpa.org
19 October 2022 | 10:00 - 11:45 CET
Projects promoting heat pump excellence

Livio Calabrese
Sales Director, Frascold
HEAT PUMP:
CLEAN HEATING IS POSSIBLE TODAY

Keynote speech

Livio Calabrese
Frascold Sales Director
COMPANY OVERVIEW
Refrigeration and air conditioning compressor manufacturer company since 1936

HQ and production plant based in Milan with branches in USA, India and China
“We support our customers during their development journey, providing refrigeration and air conditioning solutions for the specific cooling & heating challenges”
Fracold Overview

PRODUCT RANGE

RECIProCATING COMPRESSORS

HYDROCARBONS
- Single Stage
- Two-Stage
  - 0.5 to 80 HP

CO₂
- CO₂ Sub.
- CO₂ Trans.
  - 0.7 to 50 HP

ATEX SERIES
- Reciprocating compressors
- CX Screw Compressors

SCREW COMPRESSORS

SEMI HERMETIC SERIES
- Compact CX & EVO
  - 40 to 310 HP
- FVR Series
  - 30 to 180 HP

OPEN DRIVE SERIES
- ATS Series
  - 120 to 360 m³/h
HVAC CHALLENGES
Carbon Footprint reduction scenario

APPLICATION

DIRECT

• Refrigerant Losses
• GWP
• Maintenance

EMISSION REDUCTION

F-Gas REACH (RoHS 2011/65/UE)

INDIRECT

• Efficiency design
• Components selection and availability

Ecodesign Ecolabelling
Total warming impact

**DIRECT AND INDIRECT EMISSIONS**

With Montreal protocol and recent amendment ratified at Kigali, international community tried to **limited impact of climate-altering substances**.

**TEWI** Total Equivalent Warming Impact

\[
\text{TEWI} = \text{DIRECT IMPACT} + \text{INDIRECT IMPACT}
\]

**DIRECT IMPACT** Refrigerant losses

**INDIRECT IMPACT** Energy consumption

\[
\text{TEWI} = (GWP \times L \times N) + (E \times \beta \times n)
\]

- **GWP** Global Warming potential
- **L** Annual leakage rate
- **N** Operative life [years]
- **E** Annual energy consumption [kWh]
- **\(\beta\)** Carbon dioxide emission factor
- **CO2eq**
ENRAD
Case study with hydrocarbons

R290 HEAT PUMP

Decarbindustry 2022 Award: ‘The world’s most environmentally friendly furniture factory’

This project aims at making The Plus factory in Magnor, Norway, into the world’s most environmentally friendly furniture factory. Heat pumps and chillers using the refrigerant R290 are used to produce process heating and cooling for the production line. Comfort heating and cooling is provided to the building through waste heat combined with free heating and cooling from geothermal wells.
EUROKLIMAT
Case study with hydrocarbons

**REVERSIBLE HEAT PUMP with R290**

*Cafeteria – 800 sqm*

---

**HEATING AND COOLING**

2 x V25-71AXH
Atex certified compressors

Replacement of gas heating and split AC system

**FLEXIBLE – EASY TO OPERATE - SUSTAINABLE**
Case study with hydrocarbons

REVERSIBLE HEAT PUMP with R290

SYSTEM FEATURES

Heating/cooling REVERSIBLE system

High specific refrigerating capacity. SMALL FOOTPRINT

Heating capacity 112 kW

SAFETY, ensured by compliance with the ATEX Directive.
TEON
Case study with hydrocarbons

R600a GEOTHERMAL HEAT PUMP
Residential application

TINA

R600a HT water-water heat pump
Ground water source, ground source or air source
From 12kW to 60kW heating capacity for residential series
Professional series (also in cascade system) up to 500kW
T_{water_{max}} = 80^\circ C

COMPACT and SILENT OPERATION up to 41 db(A)
Case study with hydrocarbons

R290 GEOTHERMAL HEAT PUMP
Industrial application

HEATING AND COOLING

The Customer was looking for a solution with a lower environmental impact, whilst ensuring superior performance, reduced consumption, and the quietest operation.
Thanks to this new system, the Customer reduced its heating costs by approximately 58%.
Case study with hydrocarbons

**R600a GROUND SOURCE HEAT PUMP**

**PERFORMANCES**

\[
\text{COP} \left( @ T_{\text{ground}}=15^\circ \text{C}, T_{\text{water}}=35^\circ \text{C}, T_{\text{return}}=30^\circ \text{C} \right) = 6.5
\]

\[
\text{COP} \left( @ T_{\text{ground}}=15^\circ \text{C}, T_{\text{water}}=80^\circ \text{C}, T_{\text{return}}=70^\circ \text{C} \right) = 3.4
\]

**DIRECT EMISSIONS = 0**

Air Quality improved thanks to no local concentration of NOx (nitrogen monoxide dioxide) and SOx (sulfur dioxide)
SOLID ENERGY
Case study with hydrocarbons

R290 FOR SOLID ENERGY

DISTRICT HEATING

for an Ecological transition in the Comfort sector

We think HC heat pumps are ideal for helping reduce the comfort sector’s environmental impact. Cascade systems with R290 and R600a guarantee the best balance of lowering direct and indirect consumption, flexibility of use and costs

Karsten Pedersen, Technical Director at Solid Energy
Galten was founded in 1964 and today supplies heat to 2130 households.

The heat comes from wood chips, heat pumps and gas boilers with heating production 45 000 MWh annually.

Galten heating plant has 3.5 MW air to water heat pump from 2019, based on 6 Frascold CHX screw compressors.
In 2021, Galten heating plant has purchased an additional 7 MW air water heat pump designed and produced by Solid Energy based on 12 Frascold CHX screw compressors. The heat pumps absorb energy from the outdoor air with a total of 34 flat bed air coolers, with a total air flow of 3,215,000 m³/h.

Heat for district heating the grid is supplied with 70°C delivery and 38°C return temperature. The efficiency is 3.35 at 8°C outdoor air, which is the yearly average temperature in Denmark.
In 2021, Galten heating plant has purchased an additional 7 MW air water heat pump based on 12 Frascold CHX screw compressors.
The heat pumps absorb energy from the outdoor air with a total of 34 flat bed air coolers, with a total air flow of 3 215 000 m³/h.

Heat for district heating the grid is supplied with 70°C delivery and 38°C return temperature.
The efficiency is 3.35 at 8°C outdoor air, which is the yearly average temperature in Denmark.
Case study with hydrocarbons

GALTEN

SYSTEM FEATURES

HEAT PRODUCTION and WOOD SAVING
44,343 MWh x 24,5 euro/MWh
Wood chips = 1,086,400

PROJECT BENEFITS
Replacing old wood chips furnace and saving a lot of maintenance.

ELECTRICITY COST
(44,343 MWh / 3 SCOP) x 66,9 €/MWh
Electricity = 988,848 €
Løgstrup Varmeværk was founded in 1964 and today supplies heat to 743 consumers. The heat comes from solar heat, heat pumps, and gas boilers.

Heat production 16,000 MWh annually, of which 20% is covered by solar heat with 1st priority.
In 2021, Løgstrup heating plant has bought a 2.5 MW air water heat pump designed and produce by Solid Energy based on 6 Frascold CHX screw compressors. The heat pumps absorb energy from the outdoor air with a total of 5 V shape air coolers, with a total air flow of 885 500 m³/h. Heat for district heating is supplied with 70°C delivery temperature and 36°C in return temperature. The efficiency is 3,43 at 8 degrees outdoor air, which is the average year’s temperature in Denmark.
In 2021, Løgstrup heating plant has bought a 2.5 MW air water heat pump based on 6 Frascold CHX screw compressors. The heat pumps absorb energy from the outdoor air with a total of 5 V air coolers, with a total air flow of 885 500 m³/h. Heat for district heating is supplied with 70°C delivery temperature and 36°C in return temperature. The efficiency is 3.43 at 8 degrees outdoor air, which is the average year’s temperature in Denmark.
CONCLUSIONS

Decarbonization of heating is a viable option using HVAC technology and expertise with Natural Refrigerants

HCs (R290, R600a) are green gases (low GWP) providing high efficiency and are able to reach useful temperature of residential heating sector

HPs on mid-large size are not on a «prototype» stage but are already used in several applications from residential to industrial application

We are in front of a business case
THANK YOU!

Discover more about Us on www.frascold.it
Projects promoting heat pump excellence

"Queens Quay"
2021 Heat Pump City of the year Award winning project

Presented by
Adam Armour-Florence
Sustainability Officer at West Dunbartonshire Council
QUEENS QUAY DISTRICT HEATING NETWORK (DHN) - CLYDEBANK

Decarbonising Heating & Energy for a Net Zero Future
• Located between Glasgow and the Loch Lomond & Trossachs National Park;

• Often considered the ‘Gateway to the Scottish Highlands’;

• Population - just below 89,000;

• Area - 68 sq. miles;

• Small both in terms of population and land coverage;

• Boasts a diverse range of land uses, natural and built resources, and a mix of dense urban form, rugged moorland and spectacular watercourses.
West Dunbartonshire – 2045 Net Zero Emission Reduction Target

- **61% reduction**
  - Interim target (versus 2012/13 baseline) required by 2030/31 financial year

- **87% reduction**
  - Interim target (versus 2012/13 baseline) required by 2040/41 financial year

- **Net zero by end of 2045/46 financial year**

These interim targets can also be expressed in absolute values as:

- **2030/31 target** – Reduction of emissions by 20,235 tCO2e versus 2012/13 baseline (32,961 tCO2e)

- **2040/41 target** – Reduction of emissions by 28,719 tCO2e versus 2012/13 baseline (32,961 tCO2e)
Key Aims of Queens Quay District Heating Network (DHN)

- **Lower bills for residents** offering a reduced tariff and no costs for servicing or repairs.

- **Reducing carbon emissions** & decarbonising heat.

- **Increased security of supply** ensuring a minimum of down time and constant access to heat.
About the Queens Quay DHN

- Redevelopment of the John Brown’s former shipyard, Clydebank.
- The district heating scheme has been designed to supply heating to (in phases):
  - Core Scheme – properties on the redeveloped Queens Quay site.
  - Extended scheme – connection to existing buildings on neighbouring sites.
- Completed and switched-on in December 2020.
- Scotland’s largest Water Source Heat Pump installation to date.
- Council established wholly public owned energy company ‘West Dunbartonshire Energy LLP (WDE LLP)’ to oversee the strategic development of the district heating network.
- Ambitious £20million project, supported with £6.1m funding from the Low Carbon Infrastructure Transition Transition Programme (LCITP).
• Two x 2.65 MW Water Source Heat Pumps (WSHP);
• Including 2 x back up gas boilers at 7MW each which add resilience and contribute to 20MW peak demand.
• Can achieve temperatures up to 80°C if needed.
• Capacity for two more heat pumps or gas boilers in the future.
• Potential for retrofit gas boilers with Hydrogen?

River Clyde (6-12°C)

River Water Intake Station – Pumping and Filtration
• Pumping up to 160 litres of water per second.

Thermal Storage
• 120,000 litre
• Capacity for another
Energy Strategy and Infrastructure Design

LEGEND
- Red: Heat network pipework flow/return
- Black: Extension pipework
- Green: Water filtration
- Orange: Thermal store
- Yellow: Heat pumps
- Gray: Gas boilers
- Black triangle: Pumps
- Gray square: Heat Exchanger (HX)
- Black circle: Heat meter

Note: Buildings are fitted with Heat Interface Units (HIU) that replace your normal condensing boiler and does not use combustion to burn fossil fuels.
Phased Approach

- **Phase 1**
  - Clydebank Care Home - **Complete**
  - Aurora House (offices) - **Complete**
  - Titan enterprise (offices) - **Complete**
  - Clydebank Leisure Centre - **Complete**

- **Phase 2**
  - 145 x Social & Affordable Housing Units – **Complete**
  - Clydebank Town Hall & Baths - **Complete**
  - Clydebank Central Library - **Complete**
  - NHS Clydebank Health Centre – **Ongoing**

- **Phase 3 and 4 (and beyond)**
  - West College Scotland (Clydebank Campus) - **Ongoing**
  - NHS Golden Jubilee National Hospital – **Ongoing**
  - 9 x high-rise blocks (785 x dwellings) – **Ongoing**
  - Further domestic and non-domestic buildings and developments - new and existing.
Reduced Heating Tariffs for Residents

- Already making savings for residents.

- **Energy Crisis**
  - Current UK Domestic **Gas Price** (From 1 October 2022) – 10p per kWh with a daily standing charge of 28p

- Council Tariff for District Heating
  - £8.25p per kWh and no standing charge
Climate Change & Net Zero

- For every 1MW of electricity used, 3MW of heat is generated. This gives the overall system 300% efficiency.
- Contribution towards reducing carbon emissions by 15% over next 7 years.
- Initially 409 tonnes of CO₂ will be saved annually, raising to 5,705 tonnes on completion.
- Support Scotland’s ‘Climate Change (Emissions Reduction Targets) (Scotland) Act 2019’ to achieve net zero emissions by 2045.
- Delivers on requirements set out by the ‘Heat Networks (Scotland) Act 2021’.
- To achieve this, the decarbonisation of heating and energy consumption in the domestic and non-domestic building sectors will be key to achieving a net zero Scotland by 2045.
- Supports the delivery of mandatory ‘Local Heat and Energy Efficiency Strategy (LHEES)’ and delivery plan.
Series "Cumulative Gas emissions (tCO2e)"
Value: 222
Opportunities – Dalmuir & Littleholm

- Supported by the LHEES process, we identified a total of 9 high-rise blocks for connection to our DHN, located in the Dalmuir and Littleholm areas of Clydebank.

- 785 dwellings in total spread out over 9 high-rise blocks:

  - **Dalmuir:** 6 x high-rise blocks with a total of 515 dwellings. All dwellings are heated using electricity.

  - **Littleholm:** 3 x high-rise blocks with a total of 270 dwellings. All dwellings are heated using gas.
Thank you
"Heat pump as a key enabler in achieving a positive energy building"
2021 Decarbuilding Award winning project

Presented by
Morten Deding
Director for Heat Pump Application, JCI EMELA
Sustainability potential from Industrial Refrigeration
Cooling, Heating and Energy Solutions

Powerhouse Brattørkaia

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Heat Pump Director
Marine Engineer & Mechanical Engineer, MBA
Industrial Refrigeration, Europe, IREF EMEALA
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The power behind your mission
Solutions built on industry leading products

"We are a leading OEM supplier of reciprocating and screw compressors, chillers for standard and low temperature applications, heat pumps, and control systems."
Over 1600 employees

Over 900 technicians in the field

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Offices across Europe

Our European Footprint

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Czech and Slovakia
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Norway
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Portugal
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Sweden
Norway
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Norway
Sweden
Finland
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Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

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Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Offices across Europe

Our European Footprint

Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
Poland
Russia
Spain
Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
Sweden
Finland
Russia

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Austria
Belgium & Luxembourg
Denmark
Czech and Slovakia
Finland
France
Germany
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Portugal
UK & Ireland
Sweden
Norway
Netherlands
Switzerland
Austria
Italy
Norway
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Offices across Europe
Powering the future of net energy-positive buildings

Introducing OpenBlue Pioneer
Powerhouse Brattørkaia in Trondheim, Norway

Powerhouse Brattørkaia is the largest net energy-positive building in the northern hemisphere, blazing a trail for the next generation of smart buildings. Built on leading-edge innovation and deep industry expertise, this iconic building was awarded the world’s leading sustainability accreditation. This is the start of a new beginning and a smart leap into the future.

DecarBuilding Winner 2021
Powerhouse Brattørkaia, Trondheim

Location: Trondheim, Norway
Building type: Office building
Area: 18,200 m², 8 floors
Energy generation: Appr. 485,000 kWh/year
Environmental classification: BREEAM Outstanding
Building owner: Entra ASA
Architects: Snøhetta
Entrepreneur: Skanska
Project Description:

- Short description of the overall project:

Powerhouse Brattørkaia is a positive-energy building, meaning that it produces more energy than it consumes. The surface of the building is covered in solar cells to generate electricity, and this leaves a 5% surplus in the grid for the benefit of the city.

Today, building stock accounts for 40% of the world’s total energy consumption. By changing the way we build and focus on construction methods that turn buildings into renewable energy producers, the Powerhouse Brattørkaia is making huge strides towards less energy-consuming buildings.

Powerhouse Brattørkaia is the first building of its kind in Norway and a pioneering project in terms of technology, energy efficiency and production of green energy. The very dense construction of the building, good ventilation and optimal use of the sun and other renewable energy sources ensure greatly reduced energy consumption.

A prerequisite for buildings with low energy consumption is an efficient heating system, in this case a heat pump with an overall COP average of 6, which uses seawater both as a source for free cooling and as a source for the heat pump. This is combined with a low temperature central heating system.

The high COP of the heat pump is the key enabler to the building going "over the top" and becoming a surplus energy building.

- What is its purpose?

The heat pump installation is to deliver the highest possible COP and be able to cope with the variations in load and capacity that occur in an office building, with one machine only.

Efficiency is key, as the solar panels on the building generate the energy themselves, and after the building was commissioned, the performance of the installed heat pump was shown to meet specifications.

- How is it funded? (public, private, EU funds)

Private funded and governmental subsidized.

- Does it have an environmental relevance? Can you give us some data?

The building produces all electricity itself, and the solar panels on the entire building generate nearly 500,000kWh/year of electricity.

50% of the electricity consumption is used for heating the building with the heat pump and 45% for electricity consumption in the offices. A surplus of 5% remains, which is fed back into the grid.

If the efficiency and COP of the heat pump were lower than they are, then it would not be a surplus case and would not have achieved 100% carbon neutrality.
Configuration of heat pumps

What makes it over the top being a net positive building from the heat pump?
# Central heating from sea water

Trondheim, Norway

## Production of heating from sea water

<table>
<thead>
<tr>
<th>Type:</th>
<th>HeatPAC-104S single-stage heat pump R717</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step less load control 15-100%</td>
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<tr>
<td>Heat sink:</td>
<td>Sea water with intermediate circuit</td>
</tr>
<tr>
<td>Hot side:</td>
<td>Central heating or thermal storage</td>
</tr>
<tr>
<td>System:</td>
<td>Central heating system</td>
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<tr>
<td></td>
<td>Single heat pump covering full load</td>
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</tbody>
</table>

## Key Facts And Figures design

- **Cold side** = +5°C / +2°C
- **Hot side** = +40°C / +50°C
- **Cooling capacity** = 204 kW
- **Heating capacity** = 265 kW
- **Power consumption** = 61 kW
- **COP heat** = 4.3
## Central heating from sea water

Trondheim, Norway

### What makes the installation unique

<table>
<thead>
<tr>
<th></th>
<th>1/ Low temperature heating system</th>
<th>2/ Only one unit</th>
<th>3/ Natural refrigerant</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Better COP on heat pumps</td>
<td>Better part load capacity</td>
<td>Low refrigerant charge 15kg</td>
</tr>
<tr>
<td>+</td>
<td>Lower cost on heat pump</td>
<td>lower cost for installation</td>
<td>+ High efficiency from R717</td>
</tr>
<tr>
<td>+</td>
<td>Cost of Larger surface area on heaters</td>
<td>Lower complexity in installation</td>
<td>- Special technical room</td>
</tr>
<tr>
<td>+</td>
<td>Cost of thermal storage</td>
<td>Redundancy</td>
<td>- Ventilation and sniffer</td>
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<td>~</td>
<td>Equal controls and pipe size/dimensions</td>
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</tbody>
</table>
Impact from application

Warmer source
- +COP ~14%

Higher lift
- +COP ~7%

Warmer demand
- Capacity -11%
- COP -20%
- Cost ~30-50%
Increasing complexity of the heat pump

What is the impact on a heat pump from temperature?

- **Low temperature heat pumps**
  - Temperature: <55 °C – 130°F
  - Normal refrigeration equipment
  - Pressure: 28bar – 400psi
  - Price index: 100

- **Medium temperature heat pumps**
  - Temperature: <75 °C – 167°F
  - Semi normal refrigeration equipment
  - Pressure: 40-50bar 580-725psi
  - Price index: 130-150

- **High temperature heat pumps**
  - Temperature: <95 °C 203°F
  - Special heat pump equipment
  - Pressure: 60-63bar 870-913psi
  - Price index: 170-200

![Diagrams showing heat pump processes](image-url)
Heat sink, increasing evaporation temperature:
Cold side impact
• ~ +2-3% increase in capacity per degree K (~2F)
• ~ +2-3% increase in COP per degree K (~2F)

Hot side impact
Heat output increasing condensing temperature:
• ~ +0,5% crease in capacity per degree K (~2F)
• ~ -1,5..2% increase in COP per degree K (~2F)
What makes it over the top being a net positive building from the heat pump?
Compressor FIX speed VS variable speed

Part load comparison:
Refrigerant R717
Evaporating -10°C
Condensing +35°C
Reciprocating compressor; Adiabatic efficiency vs speed

Compressor
Refrigerant R717
Evaporating 10°C
Intermediate 38°C
Condensing 74°C
Cold side 18/12°C
Hot side 30/75°C
• Optimum COP obtained at LOW rpm, benefitting from surplus surface area in heat exchangers at lower capacities
Properties of Refrigerants

Refrigerants is NOT all about efficiency

- Environment
- Safety
- Legacy
- Cost
- Total cost
What is achievable and what are the impact of heat source, Capacity & COP heat?
“Zero emission heat for Orion medical factory”
2021 Decarbindustry Award winning project

Presented by
Petri Vuori
CEO, Calefa
CALEFA OY
PROJECTS PROMOTING HEAT PUMP EXCELLENCE / EHPA

Petri Vuori, CEO, Calefa Oy
19.10.2022
OUR MISSION
Profitable utilization of industrial waste heat and ambient energy sources

YOUR BENEFITS
- Improved profitability
- Energy savings, high ROI
- More efficient production
- Energy self-sufficiency
- Environmental friendliness

OUR CUSTOMERS
- Energy companies
- Manufacturing industry
- Large properties

OUR SERVICES
- AmbiHeat®-heat pump plants
- Retrofit heat pump systems as total deliveries

MANUFACTURING
- Heat recovery
- Heat pumps
- Heat transfer
DECARBINDUSTRY – WINNER 2021

CASE: ORION OYJ

ZERO-EMISSION HEAT FOR DISTRICT HEATING NETWORK AT ORION FACTORY
ORION OYJ
ZERO-EMISSION HEAT FOR DISTRICT HEATING NETWORK AT ORION MEDICAL FACTORY
Calefa AmbiHeat is 100% Finnish design and production. Modular heat pump-plants are manufactured in Finland under factory conditions.
The plant is transported in modules on site and connected to a functioning heat pump plant.
The AmbiHeat heat pump plant produces CO2-free cooling energy for process needs and heating energy for the heating network and process needs.
The AmbiHeat - heat pump plant is an unmanned plant that is monitored remotely. Monitoring, control, optimization and reporting can be performed remotely.
AWARD-WINNING CONCEPT

EHPA AWARD DECARB INDUSTRY 2021

VUODEN ENERGIAINNOVAATIO 2019

EHPA HEAT PUMP CITY OF THE YEAR 2015
STARTING POINT AND SOLUTION

- The modular AmbiHeat® heat pump plant utilizes waste heat from the production processes of Orion and energy from outdoor air (-15°C ... +30°C), producing zero emission heat (up to +90 °C) for the district heating network of the medical factory.
- Calefa designed and delivered a modular heat pump plant as a turnkey solution to Orion Oyj.
- The system improves the competitiveness, production security, sustainability and responsibility from an already good level.

BENEFITS

- Energy savings – By utilizing waste heat from their own production and energy obtained from outdoor air, Orion will reduce the need of purchased energy by as much as 70%.
- CO₂ emission reduction – Zero-emission energy obtained from production waste heat and outdoor air will reduce the CO₂ emissions of Orion by as much as 1000 tons per year.
- Secured cooling capacity – The new heat pump plant will take care of the process cooling. The old chillers remain as a back-up system.

PROJECT DETAILS

- Commissioning: 2021
- Heat pump power: 1.5 MW
- Energy savings: Reduction of up to 70% of purchased energy
- CO₂ reduction: 1000 t CO₂ / year
THANK YOU!

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www.calefa.fi
"The Earth’s favourite little healthy drinks factory ‘the blender’”
2021 People’s Choice Award winning project

Presented by
Andy Joynson
Director of European Operation, innocent
the blender

Giving the planet a seat on the design team of the earth’s favourite little healthy drinks factory

andy joynson
make natural, delicious food and drink that helps people and the planet live well and die old
become ‘good all round’
carbon neutral by 2030
‘We are the first generation to feel the impact of climate change and the last generation that can do something about it.’
the earth’s favourite little healthy drinks factory

planet friendly

cutting out carbon and minimising water usage and waste

factory for people

a great place to work that looks after its people and gives back to the community

better business

sharing what worked and what didn’t to inspire the next generation of factories
use of gas / oil and carbon intensive energy sources like regular grid

carbon neutral and 100% new renewable electric
the process

reduce energy needed
reuse energy
upcycle energy
generate renewable energy

= to carbon neutral and 100% electric
Food processing is about **heating up** and **cooling down**.
Stage 1 reduce the energy needed

- Decrease temperature level for pasteurisation - 90°C > 85°C
- Melt frozen juices with warm water instead of steam
- Maximising chill temperature (+1°C improves energy efficiency by 3%). Run the warehouse 1°C warmer.
- Multi temperature heat circuits (65°C where possible, 90°C for pasteurising & CIP)
- Split steam out into what is really required and no high temp steam reservoir to feed lower temp services
Stage 2 reuse energy

- Introduce more energy efficient pasteurisers with extended surfaces and low dTs
- Preheat CIP water with waste heat from air compressors
Stage 3 upcycle energy

• Use heat pumps to upcycle waste heat from our cooling plant (65°C & 90°C)
  • Two 250k litre heat batteries to provide service water at useful temperatures.
Stage 3 upcycle energy

Note:

- Where we can’t re-use heat – we have an e-boiler, scaled to meet these needs and avoid wasting energy making steam we don’t need.
Stage 4 *generate renewable energy*

- We still require power
- Generate renewable energy through solar panels and 2 wind turbines
  - c. 29GWh of generation
- CO2 neutral = incremental (new) RE capacity
the process

- reduce energy needed
- reuse energy
- upcycle energy
- generate renewable energy

= to carbon neutral and 100% electric
Any questions?
Process and heating requirements

AHUs / Melters – 65 C
Pasteurisers – 90 C
Steam for fillers

8.4MW Natural Gas
2.1MW @+65°C Sanitary, AHU Melters

2.4MW @+90°C Pasteurizers CIP
2.2MW @+140°C Aseptic Filling

80% efficient

Cooling and RT
Refridge & Cooling
Combine Process and HVAC requirements and RT using Heat Pumps
Stay Connected!

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19 October 2022 | 10:00 - 11:45 CET

Projects promoting heat pump excellence